

Effect of Neck Retraction Taping on Rounded Shoulder Posture in Desk Workers: An Experimental Study

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ABSTRACT

Background: Rounded shoulder posture, the most common finding in physical therapy evaluation of musculoskeletal disorders among desk workers with prevalence rate of 15.2 %.

Study design: An experimental study.

Objectives: to investigate the effect of neck retraction taping on supine measurement of rounded shoulder posture, pectoralis minor length, and normalised scapular abduction ratio in desk workers with rounded shoulder posture.

Method: 40 individuals who are desk workers having rounded shoulder posture with age 20 – 50 years were recruited by convenience sampling. Neck retraction taping using two “T” strip placed over upper trapezius and levator scapulae which were kept for 2 days. Pre and post supine measurement of rounded shoulder posture, pectoralis minor length, and normalised scapular abduction ratio was measured using measuring tape. Data was documented pre and post 2 days of intervention and analysed using paired t- test.

Results: There was a significant improvement in supine measurement of rounded shoulder posture after application of neck retraction taping. The pectoralis minor length was improved from 14.28 ± 1.769 to 15.03 ± 1.801 cms on right side and 14.37 ± 1.817 to 15.15 ± 2.060 cms on left side after removal of tape. Significant improvement in normalised scapular abduction ratio was observed post treatment.

Conclusion: The study concluded that neck retraction taping is an effective measure in correcting rounded shoulder posture in desk workers.

Key Words: Neck retraction taping, rounded shoulder posture, desk workers.

INTRODUCTION

Cumulative trauma disorder is a common diagnosis associated with work related musculoskeletal dysfunctions. [1,2] Sommerich CM (1993) stated that, occupational cumulative trauma is a form of over exertion which occurs when workers are repeatedly exposed to forceful or

prolonged activities in awkward postures or unsympathetic environments.

According to National Institute for Occupational Safety and Health (NIOSH) in 1997, musculoskeletal disorders have the second rank among health problems in desk workers. [3] About 75% of jobs today require individuals to sit behind a desk for extended

periods of time that worsens posture by end of the day due to habitual practice, chair design, or fatigue of postural muscles. [4]

One of the most common finding in physical therapy evaluation of musculoskeletal disorders among seated workers is upper quarter dysfunction with prevalence rate of 15.2 %. [3] Causative factors for upper quarter dysfunction includes static contraction of neck and shoulder to counteract the weight of head therefore greater the angle of neck flexion greater will be the load in muscles and joints. [5]

Desk workers commonly maintain position in which arm is slightly abducted and flexed position with neck in static state of contraction. [6,7] When this posture is maintained for prolonged period of time compensatory changes occurs in cervico scapular region such as protracted scapula with increased cervical lordosis and upper thoracic kyphosis which may lead to rounded shoulder posture. [8-10] Rounded shoulders, a common maladaptive posture which occurs in upto 73% of healthy subjects between the age group of 20 to 50 years and accounts for 60% of shoulder abnormalities. [11-14] Rounded shoulder posture is characterized by protracted, downwardly rotated, and anteriorly tipped scapula position with increased cervical lordosis and upper thoracic kyphosis. [9,11,15,16]

The abnormal positioning of scapula, gleno-humeral joint and cervical vertebrae change the force couples and length-tension relationships associated with this structures and causes pain. [17] The pectoralis minor muscle which aids in anterior tilting of scapula gets shortened in rounded shoulder posture which alters normal scapular kinematics. [11,18] increases the potential for subacromial impingement (ji hyun lee). [11] tight pectoral muscles depresses clavicle and lead to an increased pressure on a neurovascular bundle that runs between the clavicle and the first thoracic rib leads to neurological issues, such as

numbness, tingling, and pain in the upper chest and arm.

Recommended treatment for this malalignment and muscular dysfunctions includes ergonomic modifications, breaks, improved fitness, postural correction exercises, stretching of tight muscles, strengthening of weak and lengthened muscles, soft tissue mobilization, cervical muscle endurance training, Mckenzie exercises, behavior therapy and enhancing self-awareness of posture etc. helps to recover normal postural alignment.

Among conservative treatment available, use of various kinesio taping techniques for postural correction is increasing. Kinesio tape mimics the qualities of human skin. [19] It has roughly the same thickness as the epidermis and can be stretched between 30%-40% of its resting length longitudinally which can be applied to any muscle or joint in the body. [20,21] Its elastic quality helps to support or inhibit muscle function, support joint structure, reduce soft tissue inflammation and provides benefits to sensorimotor and proprioceptive system which helps in adjusting misalignment of musculoskeletal structures and correcting postural abnormalities. [11]

Musculoskeletal dysfunctions associated with cumulative effects of working condition demanding maintenance of static posture for prolonged period of time is common in desk workers. [22] A review of epidemiological studies concluded that posture is an independent risk factor for development of work related musculoskeletal disorders among desk workers.

Previous studies has showed positive effect of kinesio taping on forward head and rounded shoulder posture by application of neck retraction taping to and box taping respectively but, limited studies were conducted to observe effect of facilitation of cervical extensor muscle such as upper trapezius and levator scapulae with one time application of neck retraction taping (2 days) on rounded shoulder posture.

[11,18,25,26] Thus this study investigated effect of one time application of neck retraction taping on rounded shoulder posture in order to observe that, when proximal musculoskeletal malalignment such as forward head posture is treated, it improves distal segment posture such as rounded shoulder posture.

Objectives:

- To determine the effect of one time application of neck retraction taping on supine measurement of rounded shoulder posture (centimetres) on 3rd day of neck retraction taping.
- To examine changes in the pectoralis minor length (centimetres) on 3rd day of neck retraction taping.
- To identify changes in normalised scapular abduction ratio (centimetres) on 3rd day of neck retraction taping.

MATERIALS AND METHODS

Subjects:

40 subjects who are desk workers having rounded shoulder posture (acromion to plinth distance more than 1 inch) were recruited by convenience sampling. The subjects included were 17 female and 23 male with age 20 – 50 years. Subjects were excluded if they had history of upper quarter surgery or trauma, neurological deficits in upper extremity, surgical intervention affecting thorax and scapula. Written consent was obtained from all subjects and study was explained to them in detail.

Procedure:

SUPINE MEASUREMENT OF ROUNDED SHOULDER POSTURE:

Rounded shoulder posture is confirmed when the distance between posterior aspect of acromion process and the examining table is more than 1 inches. Individual positioned in supine lying with both arms by side of the body, elbow flexed and hands placing over abdomen. Therapist palpated posterior aspect of acromion process and marked with a black pen and distance between posterior aspects of acromion to

examination table was measured using tape line and recorded in centimetres.

PECTORALIS MINOR LENGTH:

Pectoralis minor length is defined as the distance from the inferomedial aspect of coracoid process to the caudal edge of the 4th rib at the sternum.

Individual is in a relaxed standing position with both the hands by side of the body. Therapist measures the distance between the infero-medial aspect of coracoids process to caudal edge of 4th rib at the sternum using tape line and recorded in centimetres.

NORMALISED SCAPULAR ABDUCTION RATIO:

Normalised scapular abduction ratio is the ratio of total scapular distance by length of the scapula. Individual is in a relaxed standing position with both the hands by side of the body. Total scapular distance is measured from third thoracic vertebrae to inferior angle of acromion and length of the scapula is measured from inferior angle of acromion to root of scapula. Both the measures was taken with tape line and recorded in centimetres and ratio of total scapular distance and length of scapula was calculated.

KINESIO TAPING:

Kinesio tape was applied bilaterally. Side which is more affected was treated first and after removal of tape from first side tape was applied to other side. Two “I” shaped strips of kinesio tape was applied. Tape was kept for 2 days.

TAPING PROCEDURE:

First tape:

Subject was in upright standing position with upper back properly exposed for taping. Females were asked to tie their hairs up or make a bun. First “I” strip was applied on right upper trapezius to facilitate this muscle. Base was placed below the occiput then right trapezius muscle was stretched by side flexion of neck to left side and applied

the tape towards the fibers of right upper trapezius with the stretch of 15-25%.

Second tape:

Second “I” strip was applied on right levator scapulae to facilitate this muscle. Base was placed below the occiput then right levator scapulae muscle was stretched by side flexion, rotation of neck to left side and slight forward flexion. Tape was applied towards the fibers of right levator scapulae muscle with the stretch of 15-25%. Same was done on other side.



Figure 1: Neck Retraction Taping On Left Side

Data analysis:

Statistical software STATA version 10.0 was used for data analysis.

Tests used for statistical analysis are:

Chi-square test

Paired ‘t’ test

RESULTS

Total numbers of participants included in this study were 40 individuals who were desk workers having rounded shoulder posture aged between 20-50 years. In this study, distribution of sample population showed 42.50% of female and 57.50% of male population. Maximum numbers of participants were found in age group of 41-50 years and minimum number of participants in age group of 20-25 years.

TABLE 1: ACROMION TO PLINTH DISTANCE IN CENTIMETERS (RIGHT)					
Measurements	Mean	Std. deviation (±)	Std. Error mean	t value	p value
Pre	7 cm	± 1.097	0.176	5.4319	<0.0001
Post	6.508 cm	± 1.13	0.181		

TABLE 2: ACROMION TO PLINTH DISTANCE IN CENTIMETERS (LEFT)					
Measurements	Mean	Std. Deviation (±)	Std. Error mean	t value	p value
Pre	7.07 cm	± 1.059	0.1717	5.7179	<0.0001
Post	6.57 cm	± 1.095	0.1774		

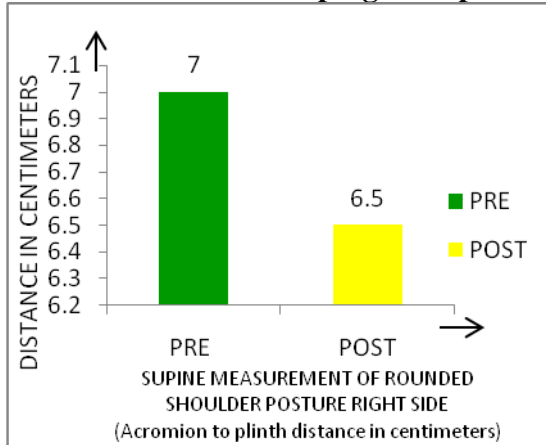
TABLE 3: PECTORALIS MINOR LENGTH MEASUREMENTS (RIGHT)					
Measurements	Mean	Std. Deviation (±)	Std. Error mean	t value	p value
Pre	14.28 cm	± 1.796	0.280	-10.7836	<0.0015
post	15.03 cm	± 1.801	0.285		

TABLE 4: PECTORALIS MINOR LENGTH MEASUREMENTS (LEFT)					
Measurements	Mean	Std. Deviation (±)	Std. Error mean	t value	p value
Pre	14.40 cm	± 1.817	0.283	-3.4079	<0.0001
post	15.15 cm	± 2.060	0.326		

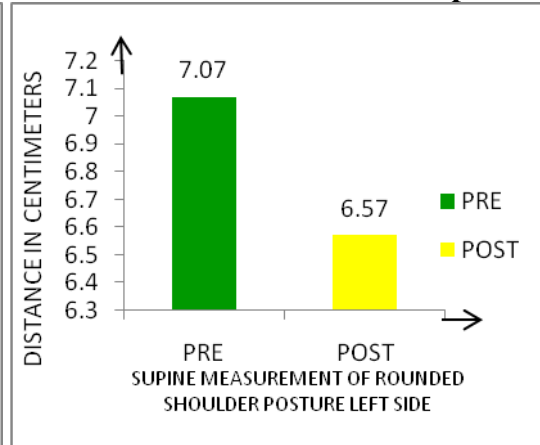
TABLE 5: NORMALISED SCAPULAR ABDUCTION RATIO (LEFT)					
Measurements	Mean	Std. Deviation (±)	Std. Error mean	t value	p value
Pre	1.444	± 0.213	0.033	3.3358	<0.0001
Post	1.361	± 0.221	0.035		

TABLE 6: NORMALISED SCAPULAR ABDUCTION RATIO (RIGHT)					
Measurements	Mean	Std. Deviation (±)	Std. Error mean	t value	p value
Pre	1.498	± 0.186	0.029	2.9272	<0.0057
Post	1.414	± 0.273	0.043		

Effect of neck retraction taping on supine measurement of rounded shoulder posture:



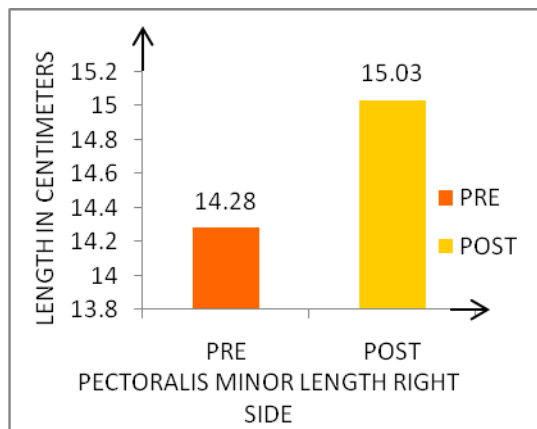
Graph: 1



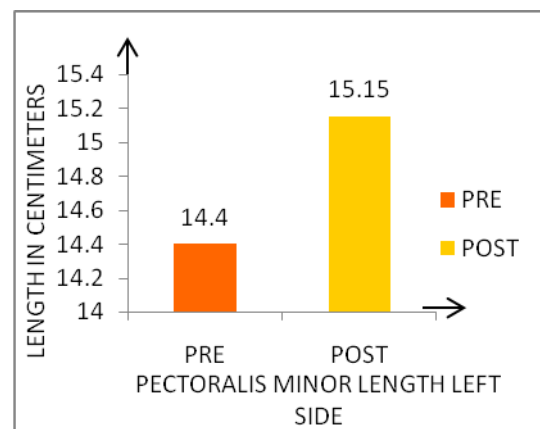
Graph: 2

Statistically significant change in mean score of acromion to plinth distance was noted after application of kinesiio taping bilaterally.

Effect of neck retraction taping on pectoralis minor length :



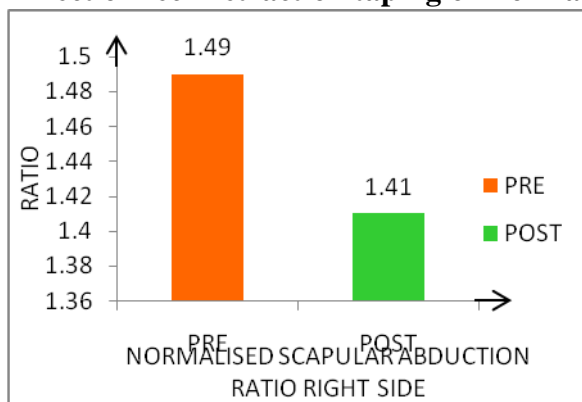
Graph: 3



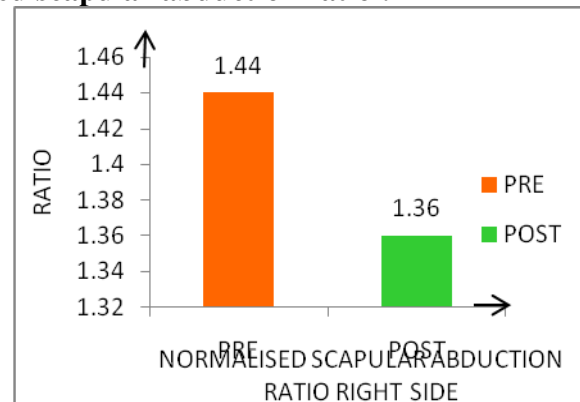
Graph: 4

Statistical significant improvement was observed in pectoralis minor length after removal of tape bilaterally.

Effect of neck retraction taping on normalised scapular abduction ratio :



Graph:5



Graph:6

Normalized scapular abduction ratio was observed to be improve after intervention on both the sides.

DISCUSSION

In the current study, individuals having rounded shoulder posture in age group of 20-50 years were selected. Saleem M. (Oct 2015) reported that, prevalence of work related musculoskeletal disorder amongst desk workers was 69.45% in age group of less than 35 years and 68.25% in age group of more than 35 years and found no association between age group and work related musculoskeletal disorders in desk workers which supports present study findings where, according to p value age wise distribution of individuals have no impact on outcome measures assessed in study. [23]

Non significant p value among gender distribution rules out gender bias: thus, gender is not going to affect outcome parameters assessed. Rohit Sharma and Ranjit Singh stated that work related musculoskeletal disorders are equally present in men and women where, 72 % men and 75% women complaining of work related upper back and shoulder complaints.

Neck retraction taping applied on trapezius and levator scapulae showed better improvement in supine measurement of rounded shoulder posture (acromion to plinth distance), pectoralis minor length and normalised scapular abduction ratio. Thus, hypothesis of the study is accepted.

When pre and post effect of neck retraction taping was assessed on supine measurement of rounded shoulder posture. Acromion to plinth distance was reduced from mean score of 7.00 ± 1.097 to 6.50 ± 1.13 on right side and mean score of 7.07 ± 1.05 to 6.57 ± 1.09 on left side after 2 days of taping. Overactive upper trapezius muscle is generally associated with weak cervical extensors. When neck retraction taping using, "I" strip with 15 to 25% tension was applied it reduces activity in upper trapezius muscle and is also associated with enhanced blood and lymph circulations at the sites where kinesio tape is applied. Thus, muscular and myofascial functions at those sites may also be affected.

[24] Konishi Y (2014) stated that kinesio

taping provides biofeedback and mechanical support for maintaining optimal head posture which provides more enhancement than that is provided by advice and exercise. Thus, return to standard head posture causes compensatory corrections in distal segment such as protracted shoulders/rounded shoulder posture.

Improvement in pectoralis minor length measurement was observed with application of neck retraction taping bilaterally. Kinesio tape improves posture with application of prolonged stretch to muscles. Hoyo M. (2013) reported that kinesio taping restores muscle function and assist in postural alignment. It facilitates immediate increase in muscle length by producing a concentric pull on the fascia, which may then stimulate increased muscle contraction. [11,20] Neck retraction taping improves muscle alignment, which may contribute to marginal increases in pectoralis minor length by correcting protracted shoulders.

While facilitating levator scapulae by neck retraction taping, 'I' strip is placed towards medial border of scapula which also have impact on scapular retractor muscles that relatively normalises scapular alignment. This improvement in scapular alignment contributes in improving normalised scapular abduction ratio.

If application of kinesio taping is done for long term by facilitation of upper trapezius and levator scapulae, long term results in improvement of supine measurement of rounded shoulder posture, pectoralis minor length and normalized scapular abduction ratio can be obtained. Thus, future research could be carried out to study long term effect of kinesio taping on supine measurement of rounded shoulder posture, pectoralis minor length and normalized scapular abduction ratio in desk workers.

CONCLUSION AND CLINICAL IMPLICATION

Neck retraction taping is an effective measure in correcting rounded shoulder

posture in desk workers and treating proximal postural malalignments have positive effect in reducing distal musculoskeletal dysfunctions.

In early phases of postural malalignment, it may appear simple but if individual maintains this incorrect posture, chronicity develops and it becomes more difficult to evaluate and treat this malalignment and muscular dysfunction. Thus it becomes essential to manage work related musculoskeletal dysfunctions during early phases to avoid chronic postural dysfunctions. [3]

Neck retraction taping provides an alternative way for correction of postural malalignment and musculoskeletal dysfunctions such as rounded shoulder posture by using kinesio tape as an initiator to stimulate proper postural control especially in working time of individual with sedentary life style.

Further studies should be done to see the long term effect of neck retraction taping on rounded shoulder posture in desk workers.

Strength and Limitations:

- There is limited evidence exploring effect of kinesio taping on cervical extrinsic muscles (upper trapezius and levator scapulae) to correct rounded shoulder posture in desk workers.
- This study was convenient to practice in available study setup.
- Most participants of this study were educated and cooperative.
- This study was in sound position to assess supine measurement of rounded shoulder posture, pectoralis minor length and normalized scapular abduction ratio.
- Individuals participated did not experienced any type of discomfort.
- Unable to keep a follow up is a limitation.

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